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# TECHNOLOGY TRANSFER IN A CHANGING NATIONAL SECURITY ENVIRONMENT

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December 1990





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This paper examines U. S. export control, with particular emphasis on technology transfer as it affects our relationship with Japan. It describes the evolution of export control in the United States, including the Bucy Report, the impact of Afghanistan, and policy changes regarding the People's Republic of China. U. S. control mechanisms for critical technology currently in place are described; these include the Export Administration Regulations, the International Traffic in Arms Regulations (ITAR), and the Militarily Critical Technologies List (MCTL). The evolution of Japan's technology base and export control mechanisms are discussed, as well as its military capabilities. Japan and the United States have had different philosophies regarding export control, with the United States more likely to use controls as part of its foreign policy. However, U. S. export control policy is increasingly seen as having an important economic security aspect in addition to its national security objectives. Changes in Eastern Europe and the Soviet Union have placed the issue of export control in a new perspective. Therefore, the paper also examines in some detail the major developments in the European community which will affect the future technology environment and its relationship to national security. This paper was originally presented at a workshop of the Japan-U. S. Joint Study Group on Trade, Finance and Technology in East-West Economic Relations. A primary purpose of the paper was to enhance mutual understanding between the United States and Japan, and to facilitate the resolution of differences in the technology security arena.

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# CONTENTS

# GLOSSARY

| | |
|---|---|
| BADGE | Base Air Defense Ground Environment |
| CFR | Code of Federal Regulations |
| CL | Control List |
| COCOM | Coordinating Committee on Multilateral Export Control |
| CTEG | Critical Technology Export Group |
| CTIITG | Critical Technology Interagency Implementation Task Group |
| DOC | Department of Commerce |
| DOS | Department of State |
| EAA | Export Administration Act |
| EAR | Export Administration Regulations |
| EC | European Community |
| ECU | European Currency Unit |
| EDAC | Economic Defense Advisory Committee |
| EEC | European Economic Community |
| FTA | Foreign Technology Assessment |
| IAEL | International Atomic Energy List |
| IIL | International Industrial List |
| IML | International Munitions List |
| IVL | individual validated license |
| ITAR | International Traffic in Arms Regulations |
| JDA | Japan Defense Agency |
| JSDS | Japanese Self Defense Force |

| | |
|---|---|
| MCTL | Militarily Critical Technologies List |
| MITI | Ministry of International Trade and Industry (Japan) |
| MOF | Ministry of Finance (Japan) |
| MOFA | Ministry of Foreign Affairs (Japan) |
| MOJ | Ministry of Justice (Japan) |
| MTCR | Missile Technology Control Regime |
| NATO | North Atlantic Treaty Organization |
| NCSIS | National Center for Science Information System |
| NPA | National Policy Agency (Japan) |
| NRC | Nuclear Regulatory Commission |
| NRL | Nuclear Referral List |
| NSF | National Science Foundation |
| OMC | Office of Munitions Control |
| PRC | People's Republic of China |
| R&D | research and development |
| SLOC | Sea Lines of Communication |
| TAC | Technical Advisory Committee |
| TTG | Technical Task Group |
| TWG | Technical Working Group |
| USML | U.S. Munitions List |

# EXECUTIVE SUMMARY

Export control as an element of national security policy to protect advanced technologies has existed since the end of World War II. Over time, several global trends have changed the expectation of what might be accomplished through export control. The world has been increasingly characterized by multicentering of both military and economic power. Centers of technical expertise have sprouted across many nations, including countries which previously were technologically undeveloped. These factors make technology control increasingly difficult and expensive. Simultaneously, experience has shown that the most effective export control tools are those which are focused through international agreement such as the Coordinating Committee on Multilateral Export Control (COCOM), which is headquartered in Paris.

In the United States, export control objectives are based upon the perception that advanced American technologies enhance existing U.S. military capability in ways which are not available to potential adversaries. Protection of such technologies both preserves the military battlefield advantage and imposes an economic burden on adversaries who choose to acquire comparable military might. Until 1968 there had been basically no commercial dialogue or exchange with the USSR or other proscribed nations. At that time there emerged a concept of an "acceptable level of trade" in which the tradeoffs in economic and military choices were recognized. With the first era of detente, policy officials formally considered the economic costs and lost commercial opportunities associated with export control restrictions.

In a landmark study published in 1976, the Bucy panel of the National Academy of Sciences set out the first explicit assessment which distilled the nature of technology. This group documented those elements of American capability which are of greatest value in preserving a defense technology lead while promoting commercial competitiveness. The panel found that technologies associated with production processes contain the most critical elements of technology value. This conclusion, and various suggestions to sharpen the balance between economic competitiveness and military technological advantage, have directed the evolution of export control since the Bucy panel.

In the current environment there are specific mechanisms to develop U.S. export control, while balancing the various interests and elements of national power. The Militarily Critical Technologies List (MCTL) provides a technical reference base for many issues ranging from individual case processing to broad policy choices. The MCTL and other technical materials are developed using a set of structured Technical Working Groups (TWGs) which consider inputs from both government and the private sector. Through a well-defined but informal process, their technical recommendations are translated into interdepartmental U.S. government positions. Technical Task Groups (TTGs), composed of members of the concerned government departments, are the primary vehicles for this process. U.S. positions are introduced into the international negotiating arena at COCOM. In concert with the other member nations (all NATO nations except Iceland, plus Japan and Australia), COCOM positions are developed which become the primary guidance for export control among the advanced nations of the West.

Maintaining an advantage in defense technology over potential adversaries has developmental as well as control dimensions. As East-West tensions began to recede after 1987, tensions with allies over issues of competition-versus-cooperation in defense technologies took on new importance; the U.S.-Japan FSX agreement of 1988 was a prime example. U.S. attention also turned to concerns about the adequacy of the U.S. defense technology base, and to issues of whether to meet the growing costs of defense technology through greater allied cooperation (cf., Nunn Amendments). Also at issue was the question of whether U.S. administration of East-West export controls has damaged the overall U.S. defense technology position.

Several dramatic, fast-moving, and historic developments are now impinging on this increasingly complex interplay between controls, competition, and cooperation in defense technology:

- Fuller economic integration of the European Community, now extended by the economic integration of East and West Germany.
- Rapid expansion of Japanese economic influence through financial markets and foreign investments, and of its product and technology penetration in U.S. and other industrial markets.
- Major reductions in East-West tensions under Glasnost.
- Growing national independence movements in the USSR, East Europe, and elsewhere.

- Rapid dispersion of advanced weapons technologies (nuclear, ballistic missile, chemical warfare, and submarine) to a growing number of Third-World countries.

Each of these developments will have a significant influence on how present defense export and technology control regimes are reshaped over the next few years. The evolution of the European Community (EC) toward its EC 92 economic integration milestone should be a critical determinant of the export control perspective of our European allies. The United States and EC need to address many issues critical to export control, trade, common standards. and related topics within the next 2 years. As just one example, the elimination of trade barriers within the EC will remove some of the distinctions which are now used to differentiate between nations which are and are not members of COCOM.

Because much of Japan's industrial success has depended upon exports, it has tended historically toward a liberal perspective on export control matters. U.S. complaints about the Toshiba machine tool export case and other less widely publicized export control breaches prompted Japan to reinforce internal control mechanisms to detect and prevent both accidental and deliberate diversion of technology to proscribed destinations. While Japan remains guarded about relaxation of defense relations with the USSR, its offers of economic aid to Eastern Europe raise the possibility that an influx of Japanese and Western technology to these nations may occur. Will these Japanese initiatives reshape its export control policies by default, or should the United States press for consultations to harmonize U.S.-Japan control policies?

Reduction of East-West tensions as a result of Glasnost raised by far the greatest range of challenges reshaping control policies. While spurring pressures for extensive relaxation of East-West controls, it has also brought reduction of military aid and arms budgets which are stimulating Third World demands for and access to advanced technology weapons systems that may increase risks to peace in areas of concern to the United States. These trends may necessitate stronger measures to control the flow of defense technology to Third World areas where hostilities are a danger.

# I. INTRODUCTION

The subject of this paper is U.S. export control, with particular emphasis on technology transfer as it affects our relationship with Japan. The historical evolution of export control is examined, and some observations are made about selected trends which are likely to be i- -tant in assessing future events. The focus is on technology control issues of particula. relevance to the United States and Japan. However, their bilateral interests are best examined in the broader context of the increasingly technology-oriented world economic system and the attendant growth of interdependencies which include Europe and other Pacific Rim nations. They, along with Japan and the United States, form the bulwark of the Free World economic system. Consequently, this paper also examines the main developments in the European community which will affect the future technological environment and its relationship to national security.

Following World War II, U.S. national policies on export control, critical technologies, and technology security developed in an environment characterized by its adversarial relationship with the Soviet Union. There was also a mostly adversarial relationship with the People's Republic of China (PRC), which eased somewhat in the 1970s and 1980s. From the 1950s until the late 1960s, the United States dominated critical areas of technology development, had a positive trade balance, and held political leadership of the Western security alliance. Since the late 1960s, this environment has gradually but steadily changed, as U.S. dominance has been diffused. European nations, Japan, and other Asian industrial nations have achieved world-class status in a wide range of technologies, as well as trade surpluses with the United States in areas including advanced technology equipment and products.

Soviet dominance of the Communist world has undergone a similar diffusion process, beginning with the deterioration of Sino-Soviet relations in the 1960s. As a consequence, the environment for export control, critical technologies, and technology security has also changed progressively, particularly in 1989 with the dramatic changes in Soviet relations with Eastern Europe. This paper will revisit early export control policies and review the implications for these policies and their implementation of recent major international developments in East-West and Third World relations.

It is important to note that export control and technology security policies are now faced with accurately adjusting to the dramatic changes in the USSR and Eastern Europe which began in 1989. Rapidly paced events in Eastern Europe now raise broad questions of technology transfer, which were not even contemplated only a few months ago. Therefore, this paper is framed within current volatile and historical events.

The current policies have evolved from a complex history, wherein security and economic policy objectives are balanced with changes in the political world. For the last several decades, the United States has addressed export controls primarily in terms of defense security. To maintain superiority in the defense technologies on which the United States has depended, export controls and technology security have played an important role. While flow of advanced technology to a determined adversary cannot be totally blocked, the rate of leakage can be slowed.

For many of our Allies, however, export control has traditionally been more of a trade issue, viewed from the perspective of minimizing restraints on trade while assuring sufficient economic and technology security. Over the past two decades, the primary challenge to maintaining Allied cooperation in export control and technology security efforts has been to achieve a successful reconciliation of these two perspectives in order to achieve both the desired level of national security and an adequate competitive freedom in the world trade system. The events of 1989 and 1990 pose a new set of issues, including (1) differentiating those technologies which still require controls from those which may now be appropriate for decontrol or even cooperation, and (2) redefining and differentiating among "adversaries," to determine whether control, decontrol, or cooperation is now the appropriate policy in light of changing U.S. and Soviet relations.

In recent years, concerns that U.S. export controls may cause losses of export sales in technologies available from other Free World sources have become more pronounced as U.S. technology firms face increased foreign competition and challenges to their survival. This threat has intensified concerns about deterioration of the U.S. defense industrial and technology base, especially in the face of declining defense budgets. Thus, U.S. export control policy is increasingly seen as having an important economic security aspect to be considered in addition to its defense security objectives.

# II. EVOLUTION OF EXPORT CONTROL IN THE UNITED STATES

## A. U.S. EXPORT CONTROL PRIOR TO 1976

As the United States entered the 1950s, the nation was recognized as preeminent in the world in terms of military might, economic viability, and technological evolution. This dominant technical and industrial position was accompanied by a political structure founded on the principles of democracy, which were to become popularized throughout much of the world in the coming years. However, grave concern for protection of this system against the perceived threat from monolithic Communism led the United States to implement a system of export controls. First unilaterally, and then through the cooperative international forum of COCOM, substantive steps were taken to preclude or delay the acquisition of advanced technology by a variety of Communist adversaries. This system was intended to deny U.S. adversaries access to advanced technologies which might help reduce the relative disadvantage of their more primitive production systems. As export controls on end-products and product/process equipment were implemented, broad restrictions on technical exchange were also imposed. These restrictions forbade any technical trade, exchange or other contact with nations adversarial to the United States and its Allies. Such a policy worked reasonably well while the United States was a leader in advanced technologies. However, the progress of historical events demanded broad evolutionary changes in this system.

Gradually, as technological development spread, principles and mechanisms of control became more complex and difficult to implement. As technologies became more widely available and as economic power spread, technology control, of necessity, became more specific and the controlled technologies more narrowly defined. The need for change was underscored by the industrial emergence of many European countries, Japan, and other nations of the Pacific Rim in the late 1960s and early 1970s. As industrial competition stimulated research and development activities, a wider availability of technological expertise evolved. The growing capabilities of Japan, Germany, and other industrial nations projected them into leadership roles in technical specialties and in some

areas of industrial output. The world had changed: it was no longer possible for the United States to isolate through unilateral actions certain nations deemed to be hostile.

Prior to 1975, export control policies focused primarily on the control of exported products. This was not due to a lack of appreciation of the importance of technologies, but emerged from the fact that only in the early seventies did detente with the Soviet Union become a national policy objective. Prior to 1970, there was an almost absolute prohibition against *any form of exports* to the USSR. Therefore, there was little need to place bounds around an area of control which was already prohibited. After detente began to take shape, with accompanying overtures to the Soviet Union, technical and policy studies were undertaken, both within and outside of the Government, to identify the products *and* technologies which were of concern and should be controlled.

From this effort a policy view evolved which was used as a basis for decisions on export control issues. This view sought to limit the availability to Communist countries of superior, lower cost Western products and technologies in order to preclude their use in military systems. Such limitations sought to raise the costs and restrict the freedom with which these countries could develop, produce, and manage military systems, or could improve the productive capability of those civilian sectors which supported the military. It was believed that these limitations would also deny to these countries the option of satisfying civilian objectives with fewer resources, permitting the savings to be applied to military programs. To accomplish these goals, the export of dual-use end products, and their embodied technologies (production tools, test equipment and processes), were to be regulated. The view was that withholding production technology, since it was applicable to both civil and military programs, was more effective than end product controls because the development of an indigenous production capability would remove Western control over the application of the products of the technology.

In a set of steps roughly analogous to the alliance strategies employed in the political and military arenas, the United States turned to Free World international actions to prevent the movement of technologies to its adversaries. Both bilateral agreements and multinational structures were so employed. The most influential of these, the Coordinating Committee on Multilateral Export Control (COCOM), is a Paris-based nontreaty organization made up of those countries who were members of NATO, less Iceland, plus Australia and Japan. Today, that organization embodies the most effective and far-reaching organ of export control. In essence, COCOM member countries agree, through a negotiating process, on which technologies and items should fall within the

categories appropriate for export control. It is then left to each nation to implement such control through its own laws and procedures created for that purpose.

## B. AWARENESS OF NEED FOR CHANGE IN POLICY

In 1968 the United States reassessed the merits and benefits, both political and economic, of expanding Western trade with the Communist countries. The cooperation of the COCOM member governments was needed to insure continued control of their rapidly advancing technological bases. Therefore, U.S. policy evolved to permit an "acceptable level of trade" in advanced products, within which Western manufacturers could create and exploit trade opportunities in the Communist Bloc countries but which would permit little, if any, significant enhancement of Communist military capabilities. This "acceptable level of trade," framed within specific export controls, was based on a balancing of Western security concerns against foreign policy and economic goals, including the administrative burdens placed on governments and manufacturers in regulating the trade in strategically significant commodities. These specific export controls had to be credible to governments and individual manufacturers as both preventing a military contribution of prohibited exports valuable to Communist military capabilities, and providing viable commercial opportunities by permitting export of non-strategic Western products.

An important example of Western concern for balanced technology transfer objectives may be found in computer technology. For computers, foreign policy and economic goals played a particularly important role because by the 1970s the United States dominated the Free World market, and there were increasing new markets for computers within the Communist Bloc. Dominance of this industry gave the U.S. special leverage in determining control policies, since its rapid technological advancement had limited the growth and independence of Western European and Japanese manufacturers. The latter two had few resources available for required indigenous research and development. This, in turn, led these countries to a continued dependence on U.S. technology, a resort to government subsidies, and a need to obtain U.S. approval of certain exports. However, the Warsaw Pact countries offered the Western European and Japanese manufacturers (and their governments) a growing market in which they could successfully compete, because Warsaw Pact access to more advanced U.S. products was restricted for U.S. national security reasons. Experience at that time seemed to indicate that Western European and Japanese manufacturers were willing to sell or license much of their indigenous computer equipment and technology. Broad U.S. national security and foreign policy goals differed

from those of major allies. Therefore, the policy of an "acceptable level of trade" was shaped to accommodate the important markets for Western European and Japanese products while continuing to restrict significant military technology transfers.

During this period, the increased demand by Warsaw Pact countries for advanced Western products and technology, ostensibly for civil uses, significantly taxed Western countries' export control administration. This administrative difficulty was also attributed, in part, to a lack of growth in administrative budgets for export controls. The situation was further intensified by the increased complexity of equipment and the variety of transactions being considered for export, and by the need to maintain a detailed control regime for countries which did not have effective and cooperative export controls equivalent to COCOM. The situation was further exacerbated by the growing use of sensitive computers in previously unembargoed Western products and the availability of products superior to Warsaw Pact capabilities in the Western consumer "over-the-counter" market. In turn, these heavy administrative burdens caused delays and other difficulties for manufacturers and exporters in completing sales agreements, causing some direct financial losses as well.

It was recognized within the U.S. government that export controls could not be static. Change was required to reflect the demonstrated growth in Warsaw Pact capabilities, the rapid diversification of Western industry, market structure, and range of products available, and the need to improve efficiency and response times in export control administration. Specifically, export controls had to be made more credible in light of the commonly perceived improvements in Warsaw Pact technological and military capabilities, the need for effectiveness in preventing regulated products from contributing to these capabilities, and the realities of COCOM inability to control advanced Western products when exported to noncooperating Free World countries or when available from these countries.

By the mid-1970s there was a common understanding and general agreement among the COCOM members on the contribution that exports of advanced Western products and technologies made to Warsaw Pact military capabilities. Within a narrow range of differing views, neither the arguments for tightening controls to reduce the loss in Western security nor those for relaxing them to permit greater Western economic gains from exports was overwhelming. Therefore, no changes were made either to strengthen or to liberalize controls during that period.

## C. THE DEFENSE SCIENCE BOARD REPORT ("BUCY" REPORT)

In 1975-76, the U.S. Department of Defense (DoD) undertook a reassessment of its export control role. This evaluation responded to expressed concerns that it was not adequately controlling the exports of critical technologies while exports of less critical products were being overly scrutinized.

The "Bucy" Task Force Report,[1] named after the chairman of the panel investigating this issue, called for a new approach to controlling technology exports, one that would focus on technology, not end-products of the technology, except for certain critical items of intrinsic military utility. The report identified the control of design, manufacturing know-how, and equipment as the principal goal of an effective policy.

The Bucy Report differentiated the degree of effectiveness found over a range of technology transfer mechanisms, emphasizing that the more active the relationship between the supplier and recipient, the more effective the transfer mechanism. The report also identified keystone manufacturing equipment and sophisticated operation and maintenance know-how as additional significant categories to be controlled. It further observed that for the most critical technologies, the United States should not release know-how beyond its borders because of the difficulties of depending on COCOM agreements for control. The panel felt that the United States should release technologies to "neutral countries" only if it was willing to assume that the technology would thus become vulnerable to transfer directly to Warsaw Pact countries. The report strongly indicated that "safeguard" efforts to preclude diversion of manufacturing equipment and know-how and, to a lesser extent, end-products for military purposes were relatively unreliable.

Based on the Bucy Report and supporting studies, the United States refocused its control efforts and concerns, particularly those related to the risk of third party transfers through noncooperating Free World countries and the questionable effectiveness of their undertakings not to divert technologies or products to unauthorized military use. The former of these two particularly bothersome issues had, for many years, conditioned the U.S. implementation of COCOM agreements. It forced regulation of exports to non-COCOM countries to the same levels as for the Warsaw Pact countries because of the lack of the recipient governments' imposition of effective controls on further transfers. This was viewed by U.S. industry as a major hindrance to export opportunity in non-allied

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[1] "An Analysis of Export Control of U.S. Technology: A DOD Perspective," J. Fred Bucy, Chairman, Office of the Director of Defense Research and Engineering, 4 February 1976.

countries. Further, the pattern of American licensing delays was not necessarily experienced by the industries of the other COCOM countries.

The latter of these two issues, the use of safeguards, had developed over the previous 5 years as a mechanism for dealing with landmark exports justified, in part, for political or foreign policy reasons. Safeguards were reasonably effective for the exports and circumstances to which they were usually applied; specifically, end-products going to open scientific and government institutions and to civil production plants. They were considered less effective in dealing with the export of intangibles such as know-how or for manufacturing equipment going to unmonitored production facilities.

Over the next several years this approach, with the assistance of government agencies and defense industries, led to the identification of technologies that were militarily critical. This cooperative effort between the defense industrial sector and government was vital to the development of a reasonable and effective list. Other broader efforts were ongoing within the government to improve export administration including the establishment of an interagency steering group,[2] drawing on the resources of government[3] and industry[4] to identify dual-use technologies. These actions developed into a program that was ultimately supported by the Congress in the Export Administration Act of 1979.

## D. THE EXPORT ADMINISTRATION ACT OF 1979

The Export Administration Act (EAA) of 1979, as amended in 1985 and 1988, forms the present legal basis for export control in the United States. This Act was developed in an environment of strong industry pressures to improve their competitive position by reducing the licensing delays in both COCOM and non-COCOM Free World markets. Industrial experience seemed to indicate that other COCOM member countries were able to process export requests or issue licenses to their manufacturers more rapidly than was possible in the United States. Concern was also voiced that the U.S. interpretation of COCOM agreements was often overly restrictive and that industry should have a greater voice in the setting of technical limits and defining administrative licensing procedures. These concerns were expressed during hearings which preceded enactment of the legislation and shaped the final form of the Act.

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2 The Critical Technology Interagency Implementation Task Group (CTIITG).

3 The Interagency Technical Task Groups (TTG) that supported the COCOM List Review process.

4 The Critical Technology Export Groups (CTEG) set up by industry at DoD's request.

The Congress, in its findings, expressed the view that exports contributed to the economic well-being of the nation and the stability of the world economy, but also that exports of products without regard to their contribution to the military potential of certain countries might adversely affect U.S. national security. It also affirmed in the Act the need to control the export of technologies that could make a significant contribution to that military potential. However, in its policy declaration, the Congress stated that export controls should only be used "...after full consideration of the impact on the economy of the United States and only to the extent necessary ... to restrict the exports of goods and technology ... which would prove detrimental to the national security of the United States."

The Secretary of State was empowered to conduct negotiations with other countries regarding their cooperation in restricting the export of goods and technology to limit foreign availability of controlled goods and technologies.

The Act gave the Secretary of Commerce the authority, in consultation with appropriate agencies and industry, *to review the foreign availability of controlled products and technologies to countries to which exports are controlled and to remove them from control if such availability existed.* The President was empowered to negotiate with the COCOM member countries at more senior levels than had been the case historically, to make COCOM a more open process, to reduce the scope of the controls to a level enforceable by all, and to increase the effectiveness of the enforcement process.

The Secretary of Defense was given primary responsibility for developing a list of military critical technologies, with emphasis on those not possessed by countries to which exports were controlled. This constituted a Congressional implementation of the earlier DoD technology control initiative.

The Congress then went on to strengthen the role of Technical Advisory Committees (TACs), which are charged to advise both the Secretaries of Commerce and Defense on (1) technical matters, (2) worldwide availability and utilization of controlled products and technologies, and (3) revisions of the international export controls. Thus, what had been perceived as an almost unilateral review and control of exports by DoD, was tempered by the strengthening of the roles of Secretaries of Commerce and State, and of industry through the TACs.

## E. THE IMPACT OF CONFLICT IN AFGHANISTAN

In December of 1979, just as the United States was beginning to implement the EAA of 1979, the Soviet Union intervened militarily in Afghanistan, and on January 4, 1980, the President imposed a series of economic restrictions which included, among other actions, a ban on *the licensing of high technology* and other strategic exports, a partial embargo on grain exports, and a boycott of the 1980 Olympics. He requested that the COCOM member countries take similar actions. The United States received some sympathy for these actions, but it could not achieve complete agreement. Then the United States unilaterally imposed a "no exceptions" policy in COCOM. That is, the United States stated that it would not approve any exceptions to the controls that had been agreed in COCOM--a procedure that normally required unanimous consent of the member countries before such an export could be made. The COCOM members did agree not to take commercial advantage of the U.S. "no exceptions" policy and to tighten the licensing procedures for exports to the Soviet Union. It is not clear that they were able to fully comply with such a strong undertaking.

The Afghan issue essentially froze many of the liberalizations contained in the Export Administration Act of 1979. Events in the People's Republic of China (PRC), however, took a different course.

## F. CHINA AND EXPORT CONTROL

The Soviet invasion of Afghanistan accelerated the normalization of trade relations with the PRC that had started in the late seventies. In July 1979, the United States granted the PRC "most favored nation" tariff status and access to U.S. Export-Import Bank credits. After the Afghan invasion, the PRC was permitted to purchase dual-use products and military support equipment. An export category, separate from the Soviet Union and the Eastern Bloc, was established for the PRC. With these liberalizations, the United States initiated a series of negotiations in COCOM which led to an easing of export controls for the PRC, with a separate differential "China" control list.

These relaxed controls placed the PRC in an extremely favorable position, vis-a-vis the Soviet Union, to receive advanced technology exports from the COCOM countries. These exports required only national licensing, statistical reporting to COCOM, and import certificates verifying that the Chinese government authorized the import. Later DoD

officials stated, "[t]his is to ensure that the goods intended for China are under government authority and will not be diverted."[5]

## G. THE EXPORT ADMINISTRATION AMENDMENTS ACT OF 1985

The 1985 Amendments Act strengthened enforcement and increased penalties for violations of export controls, upgraded support of COCOM, and directed streamlining of the licensing process. One of its primary goals was to eliminate export licensing to COCOM members for lower level products and provide automatic approval for higher level goods if the Secretary of Commerce did not deny the license in 30 days. It provided for granting "COCOM-like" treatment to other countries with which the United States has negotiated agreements to apply export restrictions comparable, in practice, to that maintained by COCOM members. The Act provided that the Secretary of Defense is to review changes in U.S. export regulations but need not concur before their issuance. Finally, the Act reaffirmed the need for the Militarily Critical Technologies List (MCTL) but required that each item be reviewed on the basis of foreign availability and be included only if it were not available from uncontrolled sources, and that, as controls on critical technologies and keystone equipments are implemented, the controls on products of those technologies and equipments should be reduced. The Congress also requested that DoD provide it with an assessment of the impact of the transfer of critical technologies on the military capabilities of controlled countries.

## H. THE ALLEN REPORT

Throughout the 1980s, export control was implemented as a part of U.S. national security policy, but commercial and competitive considerations increasingly intruded as it was debated whether U.S. export control was an impediment to technology research and development, exports, and the international competitiveness of U.S. corporations. The debate reached an intensity of such proportion that it precipitated an analysis by the National Academy of Sciences. The product of that effort, commonly called the Allen Report,[6] [after the panel chairman, General (Dr.) Lew Allen] reaffirmed the validity of both views of the issue. The report found that there were compelling reasons to have a system

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[5] "The Technology Security Program," A Report to the 99th Congress, Second Session, Caspar W. Weinberger, Secretary of Defense, 1986, pp. 64-65.

[6] *Balancing the National Interest: U.S. Security Export Controls and Global Economic Competition*, Dr. Lew Allen, Chairman, National Research Council, 1987.

of national security controls but that there also exists an equally compelling set of reasons to allow information, technologies, products, and techniques to flow freely, without undue impediment of government evaluation and decision mechanisms.

Many of the major conclusions of the Allen Report are congruent with those reached some 11 years earlier by the Bucy panel. The Allen Report affirms the linkage between Free World security interests and their use of advanced technologies in major military systems. This linkage places substantial emphasis on both the maintenance of a vigorous technology base and on barriers to the outward flow of such technologies. However, the scope of U.S. export controls, as they existed in the mid-1980s, could weaken the growth of U.S. exports and undermine the effectiveness of the control program. Further, the most important elements of an effective control program embrace many international dimensions. Thus, a system of controls implemented as a cooperative effort among many nations is the most effective system to implement the control of advanced technologies with the least adverse impact. The need for a multinational approach reflects the widespread availability of new technologies, a trend in which Japan has played a major role over the last several decades.

## I. THE OMNIBUS ACT ON INTERNATIONAL TRADE AND COMPETITIVENESS OF 1988

The 1988 Trade Act is the most recent expression by the Congress of the shift in priorities from a policy dominated by defense-security concerns to a broader view of national security, one that is more attuned to the importance of exporting and to reducing the regulatory burdens placed on U.S. industry. The Act's overall concern with national security remains paramount but clearly is tempered by a recognition of the high level of technological sophistication available from many countries, the increasing difficulty in maintaining an effective control system, and a certain disillusionment with those administering the national security side of the export control process.

In the past, export control policy has assumed that the Soviet Union was the major target of such controls, along with its client states which could act as vehicles for transferring acquired Western goods and technologies to the USSR. The PRC was considered less of a military threat, with a developing political liberalization and opening to the West that could further mitigate this threat. Exports were controlled to the smaller client states (i.e., Albania, Cuba, North Korea, Viet Nam) more for political reasons than for their direct military threat to the United States and its allies. However, in 1989, the retreat

from liberalization by the PRC and the Soviet overtures for multilateral arms reductions changed the balance of interests. Now, the generally recognized danger to the United States' defense security interests is tempered by recognition of the important contribution that economic security now makes to overall national security.

On the technical side, the cornerstone of export control has become the control of critical technology and of the means to produce significant military goods and military support equipment. Control of technology has shifted from a broad, all-encompassing approach to one which is clearly enunciated and specific. The same is true for the means to produce. The major evolution over the past decade has been toward decreasing control of dual-use (primarily commercial) *products*, in large part due to the growth of industrial capabilities in the nonaligned Free World. This diffusion of technology has made sophisticated equipment, more advanced than indigenous Soviet equipment, widely and competitively available on world markets. This ready availability of advanced equipment, despite the lack of comparable advancement by the Soviet Bloc, has made justification of re-export controls very difficult. The need to provide equal access to Soviet markets by Western manufacturers of comparable equipment has made regulations based solely on demonstrated Soviet Bloc capabilities burdensome to some industries.

The Act asserts the exceptional importance of remaining competitive in the international marketplace as a matter of economic well being. Thus, one overall goal of this Act is to limit the power of the U.S. Government to impose export control for national security reasons. Specifically, controls for national security can be imposed only to the minimum extent required to protect militarily critical technologies, and then, only if those technologies are not available in adequate quantity and quality from unrestricted sources.

The Trade Act, although dealing with many other significant trade issues, provides some significant changes to the Export Administration Act. The Trade Act: (1) further liberalizes the licensing of controlled products and technologies to the PRC; (2) removes all licensing requirements on exports to COCOM members and other cooperating countries except for supercomputers, nuclear goods and technologies, and communications monitoring equipment; (3) removes the re-export licensing requirements when the controlled U.S. content of components in other lower performance equipment is less than 25 percent of the value of the final product; and (4) removes from control all medical instruments and equipment and those goods and technologies which required notification only to COCOM. The Trade Act also presumes Secretary of Defense approval of export

control decisions by the Secretary of Commerce unless he appeals those decisions to the President within 20 days. The Act reinforces the Secretary of Commerce's role in the review of the control list, the formulating of U.S. COCOM proposals, assessment of the actual foreign availability of controlled goods and technologies, and unilateral removal of licensing requirements for those items for which he determines that foreign availability already exists. DoD retains responsibility for developing the MCTL, but its incorporation into the control lists is still subject to agreement by the Secretary of Commerce.

# III. U.S. CRITICAL TECHNOLOGY CONTROL MECHANISMS

## A. INTRODUCTION

The acquisition of national security-sensitive goods and technology by the Soviet Union and other countries whose actions or policies run counter to the national security interests of the United States has led to significant enhancement of Soviet Bloc military-industrial capabilities. The EAA of 1979, as amended in 1985 and 1988, addresses this threat by emphasizing the control of critical technologies. While stressing that *it is important for the national interest of the United States that both the private sector and the Federal Government place a high priority on exports*, Congress observed that this interest must be *consistent with the economic, security, and foreign policy objectives of the United States*. Accordingly, the Congress declared it to be the policy of the United States to use export controls to the extent necessary *to restrict the export of goods and technology which would make a significant contribution to the military potential of any other country or combination of countries which would prove detrimental to the national security of the United States*. Further, the Act stipulated that the *export controls imposed under this section should cover and (to the maximum extent consistent with the purposes of this Act) be limited to militarily critical goods and technologies*. The Act provided the necessary initiative for the first step, which was to produce a list of technologies that need protection.

The Act directed that *the Secretary of Defense and other appropriate departments shall identify goods and technology for inclusion on the control list* [§(5)(c)(2)].[7]

In summary, the export control activities sought to limit the availability of more capable and often lower cost Western technologies. It did so to deny adversary countries the means to develop, produce, and manage advanced military systems or devote additional resources to military systems.

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[7] *Militarily Critical Technologies List*, Office of the Under Secretary of Defense for Acquisition, October 1989, U.S. Government Printing Office, Washington, D.C., pp. iii-v.

## B. THE MILITARILY CRITICAL TECHNOLOGIES LIST (MCTL)

The Export Administration Act in Section 5(d)(3) states that

> The Secretary of Defense shall bear primary responsibility for developing a list of militarily critical technologies. In developing such list, primary emphasis shall be given to--
>
> (A) Arrays of design and manufacturing know-how,
>
> (B) Keystone manufacturing, inspection, and test equipment,
>
> (C) Goods accompanied by sophisticated operation, application, or maintenance know-how, and
>
> (D) Keystone equipment which would reveal or give insight into the design and manufacture of United States military systems,
>
> which are not possessed by, or available in fact from sources outside the United States to controlled countries, and which, if exported, would permit a significant advance in a military system of any such country.
>
> EAA of 1979 §(5)(d)(2)
> as amended in 1985 and 1988

The Militarily Critical Technologies List (MCTL) has been developed to respond to this requirement and in fulfillment of the responsibilities of the Secretary of Defense as outlined in Section 5(d) of the Export Administration Act of 1979. The MCTL constitutes the key element in stimulating United States actions designed to achieve protection of critical technologies and products, and to facilitate removing the restrictions on technologies and products which are not critical.

The MCTL does not per se provide the basis for determinations on technology transfer cases. In each export license case the reviewer must focus on the specifics of the proposal under consideration to determine if the critical aspects of technology as identified in the MCTL are relevant to the case, and, if relevant, whether foreign availability exists. Even in cases where critical technology transfer is determined to be involved, the reviewer may consider whether safeguards or protective measures for technology transfer may be devised. These considerations are especially important in the case of transfers to allied countries when the United States has established cooperative agreements. The MCTL thus provides a point of departure for consideration of proposed export cases. However, it is a fundamental point that the MCTL is not a comprehensive basis for case processing and resolution.

The MCTL is a dynamic document, subject to ongoing review and revision. The methodology for processing these is grounded in various Technical Working Groups which undertake detailed investigations of each technology, to include the following: research; product development; status of U.S., Soviet, COCOM and other national capabilities; assessment of the military uses of the technology and its contribution to the superiority of U.S. military capabilities. This analytical process produces practical distinctions between militarily useful technologies, which are not placed in the MCTL, and militarily critical technologies, which are. The MCTL also identifies the probable directions and progress in new technology areas that may supplant currently critical technologies.

Because of the pace of technological change, the MCTL review and revision are grounded in law and receive substantial emphasis. As directed by the Omnibus Trade and Competitiveness Act of 1988, the Secretary of Defense has established:

> ... a procedure for reviewing the goods and technologies on the list of militarily critical technologies on an ongoing basis for the purpose of removing from the list of militarily critical technologies any goods or technologies that are no longer militarily critical....

and adding to the list

> ... any good or technology that the Secretary of Defense determines is militarily critical.

Militarily critical technologies included on the MCTL must meet strict criteria. Technology included is that not available to the controlled countries and which meets at least one of the following criteria:

- Used in U.S. military system(s), either deployed or scheduled for near term deployment *and* is critical to the performance of such system(s) in that its absence would severely degrade the performance of at least one primary mission parameter.
- Represents an intelligence community projection of Warsaw Pact acquisition targets. In most instances the technology would be the same as identified by the first criterion, but it is conceivable that the technology not critical to the performance of the U.S. systems may still be of considerable importance to those under development in Warsaw Pact countries.
- Although not currently embedded in a U.S. system, is a leading edge technology with high potential for having an impact for advanced military applications.

The format of the 1989 version of the MCTL provides for a brief description of the critical technology involved, a statement of the rationale for its inclusion in the list, and the specific critical elements of that technology which include:

- **Arrays of Know-How.** Limited to the know-how and related technical information (including design and manufacturing know-how) which are not in the public domain and which are required to achieve a significant development, production, or utilization purpose. Such know-how includes services, processes, procedures, specifications, design data and criteria, and testing techniques.
- **Keystone Manufacturing, Inspection, and Test Equipment.** Equipment specifically necessary for the effective application of significant arrays of technical information and know-how.
- **Keystone Materials.** Materials specifically necessary for the effective application of significant arrays of technical information and know-how.
- **Goods Accompanied by Sophisticated Know-How.** Goods the use of which requires the provision (disclosure) of significant arrays of technical information and know-how (including operation, application, or maintenance know-how), and keystone equipment and materials, ***for which embedded know-how is inherently derivable by reverse engineering, or is revealed by use of the goods.***
- **Items of Intrinsic Military Utility.** Items other than those identified as "Keystone Manufacturing, Inspection and Test Equipment," "Keystone Materials," and "Goods Accompanied by Sophisticated Know-How" whose transfer to potential adversaries shall be controlled for the following reasons:
  - -- The end product in question could significantly enhance the recipient's military or war-making capability either because of its technology content or because of the quantity sold.
  - -- The product could be analyzed to reveal U.S. system characteristics and thereby contribute to the development of countermeasures to equivalent U.S. equipment.

It should be noted that reference to an item under "Arrays of Know-How" in the MCTL does not presuppose a potential recommendation for end-item control, except where the relevant end item is identified as "Keystone Manufacturing, Inspection and Test Equipment," "Keystone Materials," "Goods Accompanied by Sophisticated Know-How," or "Items of Intrinsic Military Utility." In most cases, the primary concern is with arrangement for the development, production, and utilization of such items. Technical

information describing basic research, a stage which precedes development, is not included.

## C. THE U.S. TECHNOLOGY CONTROL PROCESS

Critical technologies control is a complex intra- and intergovernmental process, involving the cooperation of academia and industry, and consensus and agreement undertaken by the United States and its COCOM allies. The process includes the identification of critical technologies, international negotiations leading to a common acceptance of technologies to be controlled, formulation of effective policies, development of procedures to implement them, and the licensing of products and technologies based on these policies and procedures.

In the United States, the process begins with the identification of technologies and products deemed to be militarily critical by the Department of Defense. These are compiled and placed in the MCTL. These are carefully reviewed by interagency groups, which consider whether they meet the COCOM strategic criteria for inclusion in COCOM's international strategic embargo system. If it is concluded that the strategic criteria are met, then a U.S. control proposal is prepared and submitted to COCOM. Other COCOM members submit their proposals as well. Proposals are also submitted to decontrol products and technologies determined to be no longer militarily critical. The process continues with negotiation of multilateral controls in COCOM and subsequent implementation of these controls by member nations. In the United States this may entail modifying U.S. laws and regulations, and export case review and licensing procedures.

U.S. initiatives in the critical technologies control process stem from decisions reached with regard to the MCTL, and from inputs by other departments and agencies. These decisions and inputs are generated by the inter-departmental Technical Task Groups (TTGs), established by the Department of State (DOS); the Technical Working Groups (TWGs), organized by the Institute for Defense Analyses (IDA) on behalf of the DoD; and the industrial Technical Advisory Committees (TACs), organized by the Department of Commerce (DOC) and embracing a specific industry perspective. The U.S. Government oversees activities concerning export control through the Economic Defense Advisory Committee (EDAC), which has membership from a number of government agencies and organizations and is chaired by a representative of the DOS.

The process begins with the construction of the MCTL by the TWGs. The TWGs, administered by IDA, have knowledgeable technical persons from DoD, other departments

such as Energy and Commerce, other government agencies, industry, and academia as members. Each TWG (currently there are 12) is responsible for accomplishing the necessary analyses and actions required to update the portions of the MCTL for which they are responsible. They identify technologies of a militarily critical nature in their areas of responsibility and ensure, where appropriate, that timely recommendations are made to bring such technologies under export control. To accomplish this, the TWGs prepare and forward to the TTGs technical proposals relevant to their portion of the MCTL. The technical parameters in each proposal must be fully substantiated by the relevant MCTL items and associated Foreign Technology Assessments (FTAs). The TWGs also participate in the identification of control levels for West-to-West control of technology and products where necessary or appropriate.

The 12 interdepartmental Technical Task Groups (TTGs) meet periodically and recommend technologies and products for control or decontrol in COCOM. TTG membership consists of governmental personnel, with a chairperson designated by the Department of State. The TTGs review the recommendations of the TWGs and technical papers submitted by other government agencies, make determinations on various items under negotiation or discussion, including determining the characteristics of items of equipment, estimating the reasonableness of bringing items under control, and assisting in determining potential control candidates. The TTGs forward requirements to intelligence agencies for information needed to make informed decisions, arrange for governmental and contractor technical advice and consultation, coordinate positions with other task groups when appropriate, and prepare and submit proposed revisions to COCOM's International Industrial List (IIL), International Munitions List (IML), the International Atomic Energy List (IAEL), and related U.S. export control documents.

Technical Advisory Committees have been established under the provisions of the EAA to provide the Department of Commerce and other government agencies with advice and assistance regarding wide-ranging aspects of controls affecting U.S-produced articles, materials, and supplies (including technical data and information) subject to export control. These government-sponsored advisory groups consist of members from industry and government. Their recommendations are considered during the revision of the MCTL by the TWGs and during preparation of U.S. COCOM proposals by the TTGs. Members may participate in COCOM negotiations when invited.

Within the United States there is also a series of control lists. The U.S. Control List (CL), maintained by the Department of Commerce, is a part of the Export

Administration Regulations (EAR § 799.1) and represents the implementation of the Export Administration Act. In content it corresponds to the IIL, and it is modified after changes in the IIL are negotiated in COCOM. One difference between the IIL and CL is that the CL contains items which are unilaterally controlled by the United States. This may occur for national security, nuclear non-proliferation, or foreign policy reasons.

Another control list in the United States is the U.S. Munitions List (USML), which identifies arms, ammunition, and implements of war contained in the International Traffic in Arms Regulations (ITAR). This list also is published as part of the Export Administration Regulations (Supplement 2 to EAR § 770), but is maintained by the Department of State, Office of Munitions Control. It refers specifically to military, rather than dual-use, equipment and technology. It is the primary vehicle used to control items listed on the IML.

The Nuclear Referral List (NRL), maintained by the Nuclear Regulatory Commission (NRC), is part of the Export Administration Regulations. It controls nuclear-related materials and technology and is published as Supplement 3 to EAR § 770. It relates to the IAEL.

Together, these control lists contain the products and technologies that the United States believes are important to protect from potential adversaries. They are under continual review in order to maintain an appropriate balance between national security and economic benefits.

## D. EXPORT ADMINISTRATION REGULATIONS (EAR)

The Export Administration Regulations are issued by the DOC pursuant to provisions of the Export Administration Act (EAA). A major part of the EAR is Part 799.1, the U.S. Control List (CL). The CL reflects implementation by the Secretary of Commerce of the policy guidelines in the EAA.

The EAR define the conditions under which a commodity may be exported using a General License and those instances in which a Validated Export License is required. A General License is a general authorization permitting the export of certain commodities and technical data without the necessity of applying for a separate license document for each shipment. A Validated Export License, rather than a General License, is required if the commodity or technology to be exported is in one of the following categories:

- A *strategic* commodity bound for any destination (or, in a few cases, one bound only for a destination, such as communist countries, to which exports are restricted for national security reasons). A strategic commodity is defined as one believed to be capable of contributing significantly to the design, manufacture, or utilization of military hardware.
- A *short-supply* commodity to any destination. A short-supply commodity is one in short supply in the United States and wanted abroad and which, if permitted to be exported without restriction, could result in an excessive drain on U.S. supplies and have a serious inflationary impact on the U.S. economy.
- Any other commodity bound for a destination for which there are serious foreign policy concerns.
- *Unpublished technical data* to certain destinations. The term unpublished technical data refers to technical information, generally related to the design, production, or use of a product, that is not available to the public. Such data is not described in detail in books, magazines, or pamphlets, nor is it taught in colleges or universities. It is know-how that would not be released by the holders without a significant charge.

## E. INTERNATIONAL TRAFFIC IN ARMS REGULATIONS (ITAR)

The ITAR is the basic set of regulations for control of U.S. exports of munitions and implements of war. The U.S. Department of State, Office of Munitions Control (OMC), is responsible for maintaining the USML, which is also contained in Supplement No. 2 to Part 770 of the EAR. The USML identifies the arms, ammunition, and implements of war by category that are addressed in the ITAR. Due to U.S. laws and regulations, certain items identified in the MCTL as dual-use items and con rolled in COCOM on the IIL are also included in the USML, which is incorporated in the ITAR. Conversely, some items controlled in COCOM on the IML are listed in the CL and are licensed by DOC.

## F. NUCLEAR ENERGY REGULATIONS

The Nuclear Regulatory Commission (NRC) maintains a list of equipment and material that are under NRC licensing authority and are included in Supplement 3 to Part 770 of the EAR and in the 5.0. Code of Federal Regulations Title 10, Chapter I, Part 110. Additional regulations authorized by the Secretary of Energy based on the Atomic Energy Act of 1954, which established requirements applicable to unclassified activities in foreign atomic energy programs, are specified in CFR Title 10, Chapter III, Part 810. The NRC

also controls the export of special nuclear materials and facilities as prescribed by the Atomic Energy Act. This Department of Energy regulation prohibits all persons within or under the jurisdiction of the United States from directly or indirectly engaging in the production of any special nuclear material (including the supplying of equipment, materials, or technical data) outside the United States Certain activities outside the United States involving the production of special nuclear materials, reprocessing, isotope separation, the production of heavy water, and the fabrication of nuclear fuel containing plutonium require a specific authorization by the Secretary of Energy.

## G. SUMMARY

The technology control mechanisms implemented by the United States Government involve a variety of agencies and activities, and support different policy goals through multiple processes. They are, themselves, products of policy evolution. As such they do not serve all interests equally, and are subject to frequent criticism, debate, and dialogue. Most important, they constitute a part of the changing processes of government and are subject to periodic change as government priorities and policies change or when weaknesses are recognized. Steps are then identified and implemented which reshape these tools to better support the goals, priorities, and policy objectives of the government.

# IV. U.S.-JAPAN TECHNOLOGY CONTROL RELATIONS

## A. EVOLUTION OF THE JAPANESE TECHNOLOGY BASE

The evolution of the Japanese technology base over the past 40 years has been impressive. Many changes in technology and the world economy have accompanied this growth. During the 1970s Japan faced rising oil prices and adjustments in exchange rates which slowed industrial growth through the 1980s. However, these events stimulated a major shift from heavy manufacturing into higher value-added industries which in turn has fostered new growth. At the same time, Japan has become a major factor in production, technology development, and even basic research abroad in advanced technology industries, especially in Southeast Asia, the United States, and Europe. Japan has dynamic research programs in every important advanced technology area, highlighted by stars such as semiconductors, superconductivity, artificial intelligence, avionics, space, and biotechnology.

In light of the anticipated aging of its population and future declines in the growth of its labor force, Japan has gradually and consciously shifted its emphasis from heavy manufacturing to a knowledge-intensive industrial and technology base. Having already achieved world-class performance in the manufacturing and many process industries, Japan has also achieved a leadership role in the commercialization of knowledge industries on which future technological developments depend. The importance of Japanese contributions to the development of advanced technologies is seen in the degree to which others are seeking technology from Japan. New programs have sprung up in the United States to improve U.S. access to emerging Japanese technologies; for example, the National Science Foundation (NSF) in Washington this year established links by computer to Tokyo's National Center for Science Information System (NCSIS). This will allow on-line access to scientific databases. The Department of Commerce runs a Japanese Technical Literature program from its Office of Commercial Affairs. However, U.S. industry's interest in acquiring Japanese technologies remains generally limited, hindered by access barriers, as well as motivational, cultural, linguistic and other obstacles.

Japan has also recognized that despite its exceptional applied research capabilities in identifying and commercializing leading foreign technologies, its capabilities and efforts in basic research lag far behind. As the supply of new foreign technologies not yet exploited commercially by Japan has diminished, Japan has also realized that it must invest more heavily in basic research required to generate domestically more of the scientific foundations for the leading technologies of the future.

## B. JAPAN'S CONCEPT OF THREAT AND EXPORT CONTROL

From a broad political perspective, the environment for export control in Japan appears in principle highly compatible with U.S. objectives. As a matter of long-standing public policy, consonant with its antiwar and antinuclear constitution, Japan maintains an explicit policy of prohibiting export of arms and military technology, to the point that obtaining U.S. access to Japanese defense technology had to be the subject of exceptions negotiated bilaterally with the Government of Japan. However, emergence of more and more dual-use-technology product and component exports, particularly in microelectronics, has increased the problems of interpreting and identifying which exports should be subject to control, and which not; differentiation between civil and military applications may be impossible to determine from export documentation.

The intensity of Japan's drive to achieve world status and leadership in new technologies, shared by both its government and industry, has tended to weaken the rigor of Japan's export control interpretation and enforcement where major export opportunities are at stake. However, in other cases, where sharing of its equipment or technology through exports might compromise or reduce Japan's competitive advantage, Japanese firms and officials tend to exaggerate these export restrictions. Since the United States and Western Europe are leading competitors of Japan, while the USSR and Eastern Europe are to a much greater extent buyers than competitors, some in the United States have supposed that Japan's export administration may sometimes be inconsistent and tend to favor the Warsaw Pact more than NATO.[8] In any event, it was understandably important for NATO to gain and maintain Japan's cooperation in operation of a well-defined and well-enforced

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[8] This atmosphere took a turn for the better following the 1987 controversy over the export of submarine propeller milling equipment involving Toshiba and a Swedish firm. Since the outburst of U.S. criticism of Japan following that incident, the Government of Japan has been much more serious and rigorous about enforcing its export controls.

export control regime consonant with COCOM efforts. Such agreement was achieved in 1952.

Japan's export control system affects its relationships with the United States, the Soviet Union, the People's Republic of China (PRC), and Eastern Europe. Each of these views Japan's export control system from a different perspective. The United States sees Japan's system as increasingly important to the maintenance of Western technological superiority and a key element in preserving Western security, as Japan becomes a more important source of new technologies. The Soviet Union, on the other hand, views Japan's export control system as an obstacle to Soviet efforts to attain parity with the West in advanced military systems and, to a lesser extent, parity as a competitor in the marketplace. The PRC and Eastern European nations see the system primarily as a nuisance and a hindrance to their modernization efforts.

In direct arms sales, Japan has strong programs for control of arms and military technology exports; its policy guidelines state that arms and defense technologies cannot be sold abroad. Japan controls missile-related technology through its own lists and also participates actively in the Missile Technology Control Regime (MTCR). Japan actively supports restrictions on COCOM's nuclear-related items and is a signatory of the Non-proliferation Treaty, as well as a participant in other groups which restrict nuclear-related technology. Arms are controlled through the Export Trade Control Order that corresponds with the COCOM list. However, Japan appears to differ from the United States in its assessment of the extent to which dual-use technologies constitute a threat to security.

The United States uses export control as a means of implementing foreign policy, an approach which, in general, Japan does not support. In fact, for most countries, trade and other economic considerations are a main focus of their foreign policies, and they choose not to incorporate technical security issues into the evolution of their foreign policies. The United States does not wish to support, either implicitly or explicitly, foreign activities which it considers detrimental to its interests. When the United States suspended trade with the Soviet Union, Japan instituted a temporary suspension also. However, in general, the Japanese system does not provide for export control based on foreign policy considerations, although as Japan continues to take more responsibility for its own military security, these issues may receive more recognition.

The Soviet Union does not represent a significant portion of Japan's trade, either export or import, and Japan has not evidenced a strong desire to expand this trade. It has

not pushed aggressively for changes which would benefit such trade. On the other hand, Japan, along with other COCOM members, has not considered the threat from the Warsaw Pact to be as great as has the United States. However, in the past year, in contrast to the NATO countries' perception of the Soviet threat, Japan has continued to view the size and nature of the Soviet threat to it in East Asia as basically undiminished, despite the great reduction of tensions in Eastern Europe.

## C. EVOLUTION OF JAPANESE EXPORT CONTROLS

Japan, a COCOM member since 1952, has adhered to all the established COCOM rules and has agreed, in principle, that it is important to prohibit the export of certain technologies to the Warsaw Pact. However, it took the 1987 Toshiba machine case to create a new awareness inside and outside of Japan that both Japanese and Western security can be directly related to Japanese trade policies and the enforcement of its export control rules.

Japan has moved from being primarily an importer of technology in the 1950s and 1960s to one of the world's major exporters of high technology products in the 1980s. It achieved this new status through a combination of coordinated technology acquisition, high levels of R&D and investment in product development and improvement, intense attention to manufacturing efficiency and quality control, and aggressive marketing activities. While the United States and Western European countries were devoting a large amount of government R&D funding to defense-related technologies, Japan was focusing on commercial applications, and had a relatively small defense component in its national R&D budget. By 1980, dual-use high technology markets had dramatically shifted from being primarily defense driven to being consumer oriented. The characteristics of international competition and fast-paced technological developments resulted in large-scale availability of dual-use high technology equipment and commodities, many of which were being restricted and controlled by COCOM or, unilaterally, by the United States.

During the detente years of 1972 to 1980, the number of items on the COCOM embargo lists was significantly reduced, and Japanese (within its no-arms-export policy) and many Western companies achieved significant earnings in high technology deals with the Warsaw Pact. For the most part, national security concerns regarding exports were secondary. During this period, most COCOM members believed a weak embargo policy was in their best national economic interests.

In evolving from that period, Japan has made many adjustments. Currently, there are a total of 183 different commodity categories (217 if subdivisions are included) on Japan's restricted list. The major categories of restricted items that obviously fall in the realm of national security concerns include: munitions, nuclear-related materials, missile technology, chemicals applicable to chemical weapons production, and associated high technology data. The vast majority of restricted commodities/technologies on Japan's control list fall into the category of strategic dual-use commodities. COCOM members have determined these commodities and/or their technologies to be critical for the national security and well-being of the Free World.

Within the Government of Japan, the main participants in the export control process are the Ministry of International Trade and Industry (MITI), the Ministry of Foreign Affairs (MOFA), the Ministry of Finance (MOF) in which the Customs and Tariff Bureau is the key player, the National Police Agency (NPA), the Ministry of Justice (MOJ), and the Japan Defense Agency (JDA). Prior to 1987, MITI clearly had the lead in export control policy formulation and administrative supervision. However, the reaction from the United States over Japan's, and specifically MITI's, handling of the Toshiba machine case severely shook the Nakasone Government. MITI now shares some export control policy authority with MOFA.

Japan, primarily in response to U.S. criticism, quickly amended its basic law governing trade and established new mechanisms designed to strengthen the enforcement of its strategic trade control policy. Specifically, Japan:

1. Increased the sanctions and penalties for violations of its revised Foreign Exchange and Foreign Trade Control Law.
2. Expanded Ministry of International Trade and Industry (MITI) export licensing procedures to allow better scrutiny of applications and to increase on-site pre-licensing inspection.
3. Established a number of interagency fora to facilitate better cooperation and more effective working relationships among ministries and agencies involved in export control.
4. Agreed to the establishment of a joint U.S.-Japan Council to facilitate bilateral cooperation in COCOM and export control related activities.
5. Expanded and upgraded its presence on the COCOM permanent staff.
6. Forced Japanese companies to establish or improve their internal export control compliance programs to help preclude another Toshiba-like case.

7. Acknowledged in the amended Foreign Exchange and Foreign Trade Control Law that its export control system has important bearing on Japan's national security.[9]

Japanese customs law requires all exports to have an export declaration and a permit for export from Customs. The Foreign Exchange Law further stipulates that an export license must be obtained from MITI for all shipments of controlled products. Japan has two types of export licenses: the individual validated license (IVL) and the recently initiated "comprehensive" export license. Most of Japan's license applications are in the categories of computers, integrated circuits, recording equipment, electrical measuring equipment, semiconductors, machine tools, and numerically controlled equipment.

Japan adheres closely to COCOM-issued restrictions and now maintains what has been described as a moderately effective export control system. The system was characterized as moderately effective because the organization focuses more on preventing the "accidental diverter" than the "dedicated diverter." Japan's recent strengthening of its export control mechanisms clearly emphasized increasing the administrative aspects of control over the enforcement side. The homogeneity of the Japanese people and their ingrained loyalty to group, employer, and to country are considered by most Japanese to be effective deterrents to illegal export activities.

## D. EVOLUTION OF JAPANESE MILITARY CAPABILITIES AND RESPONSIBILITIES

For most of the last 30 years, Japan has been a constitutionally limited nation whose military agenda has been one of modest self-defense capability and moderate defense budgets, under an umbrella of U.S. defense support and cooperation. Indigenous production of armaments was not a major element in the country's industrial mix, and exports of equipment having defense application were insignificant. Starting in the early 1980s, however, the picture began to alter with Japan's agreement to expand its defensive responsibilities.

Beginning in 1983 successive governments commenced a re-equipment program to fulfill these new responsibilities. Major electronics projects, including a $640 million integrated digital defense communications network, were approved. Among new electronics programs are the modernization of the Japanese Air Self Defense Force's Base

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9 Richard P. Cassidy, "Japan's Export Control System and Its Importance to National Security," 31 May 1989.

Air Defense Ground Environment (BADGE) and an air defense communications system based on a U.S. communications satellite and digital microwave links.

Simultaneously, Japan's capability in electronics, aviation and aerospace, advanced materials, communications, computers, photonics, and associated fields brought many technologies with military applications. In certain areas of "new wave" electronic technology such as fiber optics, high definition television, ceramic packaging, and gallium arsenide circuitry, Japan leads the world commercially. Quite naturally, these capabilities find their way into the upgrade and reequipment of the Japanese military.

The Japanese government is also backing military-specific research into development of major conventional defense systems such as aircraft, missiles, tanks, and submarines, as well as subsystems in communications and electronic warfare. As Japan's annual defense budget now approaches or exceeds the individual budgets of the United Kingdom, Germany, and France, its ability to develop and support technical capability in both defense production and weapons system application makes it a major contender in international defense technology.

Japanese government programs have included measures to build industrial infrastructure with defense capabilities intended to employ advanced technology systems. These programs serve both Japan's national industrial development and its defense interests. A good illustration is found in the aerospace industry. For each generation of commercial aircraft, the Japanese have participated in the production of the foreign aircraft purchased, whether for domestic or international use, by Japanese carriers. The specific participation arrangements have varied from subcontractor or license agreement to coproduction and, finally, to codevelopment. Over time, this participation has yielded strong bonds between Japanese venture partners and U.S. manufacturers, especially the Boeing Company. In the mid-1980s, a Japanese venture group was formed for teaming with the Boeing on its 7J7 project. This was to have provided broad Japanese sharing in management, financing, and technical development of a new transport aircraft. Although the first project was discontinued, the even newer Boeing 777 development has been announced and agreement has been reached for Japan's three leading aerospace firms to gain roughly a 20 percent participation in the aircraft's development.[10]

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10 "Boeing Selects Design for 777 Candidate," *Aviation Week and Space Technology*, Vol. 131, No. 25, December 18, 1989, p. 107. See also "Boeing, Japanese Firms Seen Near Pact on B-777 - Analysts," by Linda Sieg, Reuter News Reports via NewsNet, Wednesday, April 11, 1990. As the aircraft approaches commercial stat. , reportedly it will be redesignated the B-767.

Japan's military procurement practice illustrates a further dimension of industrial evolution. The Japanese Self Defense Force (JSDF) is a modern, well-equipped and well-trained force of land, sea, and air elements. Many of their end-item weapon systems are of U.S. origin and licensed for production in Japan. For example, the F-15, C-130, P-3, Nike and Hawk families of missiles, and other weapons were acquired through coproduction and licensing arrangements. While such practices increase weapon system cost by a factor of about 0.5 or more, the increased expenditure also buys industrial capability and technical know-how. For the Japanese, such programs evolve into vital industrial and national security capability. From a U.S. defense perspective, Japanese production capabilities constitute a significant augmentation of the total Free World defense industrial base. As such, in a prolonged crisis of major proportions they could support production of a limited number of major weapon systems which are vital to the West.

As Japan has broadened and deepened its defense production and technology capabilities, and has become a world leader and competitor in microelectronics and an impressive array of other dual-use technologies, a further evolution has begun in U.S.-Japan defense relationships. As this evolution has progressed, U.S. technology transfers to Japan in militarily-related systems have increasingly had results which are simultaneously cooperative and competitive. With U.S. national security now being seen as more dependent on economic and technology strengths as well as on military capabilities, the transfer of further U.S. defense and dual-use technologies to Japan is increasingly considered for its impact on U.S. industrial and technological competitiveness and on the defense industrial and technology base. This emerging U.S.-Japan relationship will involve (1) more critical evaluation of competitive effects of technology transfers to Japan, (2) identification and acquisition of more defense-related Japanese technologies, and (3) greater cooperation in cooperative research and joint development of defense-related technologies.[11] A number of initiatives are now underway within DoD to implement elements of this more balanced security relationship.

It is clear that the Japanese approach to developing domestic technology and production capability as it acquires new foreign-developed systems has also resulted in the fielding of credible major weapon systems. Coupled with excellent training and exercises, the net result is a quality military force. Such forces make possible a significant expansion

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[11] The FSX controversy of 1988-89 played a major role in reshaping U.S. policies toward defense cooperation with Japan. See *The FSX: A Case Study of Defense Industrial Cooperation in the Pacific Rim*, by Erland Heginbotham and Richard Van Atta, IDA Paper P-2305, October, 1989.

in missions for Japanese forces. The most timely of these was the acceptance by the JSDF in 1985 of patrol and security responsibility for Sea Lines of Communication (SLOC) to a distance of 1,000 nmi from the Japanese main islands. This primarily maritime effort has been coupled with strong air defense and ground force initiatives. Japan's sharing of an increased defense burden in the North Pacific has correspondingly reduced U.S. defense responsibilities in the immediate vicinity of Japan.[12]

The Japanese military, in a manner similar to its U.S. counterpart, reflects the result of commitment to high quality, advanced technology systems. Such systems are obviously useful in increasing the effectiveness of uniformed personnel and compensating for fielding fewer systems and units than potential adversaries.

## E. PROSPECTS FOR U.S.-JAPAN TECHNOLOGY COOPERATION

U.S.-Japan technology relations have undergone a rapid and sweeping evolution since World War II, beginning with early Japanese dependence on U.S. technologies, followed by gradual growth of independent Japanese capabilities in the 1960s and 1970s, reaching a stage in the late 1980s of extensive parity between many U.S. and Japanese technologies, with some dependence by each on the other. As we enter the 1990s, major conflicting forces create uniquely difficult challenges for the two countries as they attempt to reach and manage a mutually acceptable and sustainable balance between the push of their growing technology-based competition, and the pull of potential mutual benefits from continuing and expanding technology cooperation.

In early post-World War II years, as tensions and hostilities with communist powers developed and spread, the United States and Japan hastened to cooperate in *defense* technology. At the earliest stage, the United States provided technologically advanced conventional defense systems for Japan's Self Defense Forces. Subsequently, U.S. defense technology assisted development of a growing degree of Japanese defense production capability, promoted both by coproduction and independent system developments, particularly involving ground and air defense systems such as missiles and both ground and aircraft platforms and systems. The record of military missile and aircraft

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12 At the same time, the potential for expansion of Japan's defense role beyond its immediate SLOC parameter is severely constrained by strong opposition in the Pacific region to any move suggesting resurgence of a military role by Japan in the region, and by strong pacifist sentiments within the Japanese population.

agreements between the United States and Japan covers the entire lifespan of the Japanese Self Defense Force.

A dual watershed in defense cooperation policies was marked by the conclusion of the U.S.-Japan FSX agreement in 1989. In one stroke this agreement extended U.S. cooperation beyond coproduction to include, for the first time with any U.S. ally, codesign and codevelopment of a major aircraft system. At the same time, it resulted in new U.S. defense cooperation policy measures aimed at preventing any transfers of U.S. defense technology to an ally from eroding U.S. technology advantages considered uniquely important to U.S. competitiveness. The FSX agreement dramatically epitomizes the heightened U.S.-Japan tensions between defense cooperation and competition.

Japanese and American counterparts have worked well and productively together on many aviation-related developments. The coproduction of a number of military aircraft have made both nations aware of the competitive considerations inherent in aircraft development and manufacture. On the commercial side, Japanese participation with the Boeing Company over many years has led to increased awareness of potentials for product improvements, good cost control methods and technology transfer techniques. There now appears to be a new opening for joint product development based on the Boeing 767 aircraft, as three Japanese aerospace companies recently reached agreement with Boeing on a 20 percent share. This resumes a cooperative relationship which suffered a setback when Boeing cancelled an early 7J7 project with Japan for lack of anticipated demand. Derivatives and follow-ons will assure greater competitive advantage in the markets of the future in terms of efficiency, reliability, and cost per seat mile.

In space technology, beginning many years ago, Japanese space programs acquired techniques and capabilities from the United States as a part of a comprehensive Japanese effort to acquire the technical capability to enter the commercial space market. This cooperation was the result of a compromise between Japanese desires to develop a space capability independently, and U.S. concerns to have access to the market for Japan's space program. With U.S. cooperation, the Japanese have been able to harness what others have done with respect to satellite development, launch, and control. The H-II launch vehicle is an example of the capabilities which will make Japan competitive in commercial space activities in the future. Early cooperative arrangements with Ford Aerospace and other American firms provided an initial capability in communications satellites which could be expanded and modified so that Japan would have space-oriented capabilities uniquely suited to Japanese capabilities and needs.

Over the past four decades, massive transfers of U.S. technology to Japan have taken place though private means, through both academic and private commercial channels. In contrast to the United States where the government funds roughly half of national R&D and a large percent of research is done at academic facilities (particularly in basic research), in Japan, firms finance and conduct the vast majority of all R&D. Thus U.S. technology transfers from firms and academic research have gone preponderantly to Japanese corporations. Some transfer was initiated by Japanese efforts through visits, academic exchanges, and study in the United States. Some was jointly agreed to through sale, license, and joint venture arrangements in exchange for fees and royalties. Some of this transfer was entirely voluntary as U.S. firms sought to get returns for their technology from a country where they did not plan to market directly. Much, however, was partly involuntary when U.S. firms found that the obstacles to investing and marketing in Japan and the costs and extended efforts required to do so, were prohibitive; selling or licensing these technologies offered a compromise means of achieving some return from a market that they and other foreign firms found too difficult and costly to penetrate.

As the United States and Japan struggle to achieve a dynamic balance between technological competition and cooperation in the 1990s, numerous major forces will be active in defining the balance. These include both commercial and defense-related forces.

Among forces likely to encourage U.S.-Japan efforts at cooperation are:

- Defense budget reductions that make research more dependent on cost-sharing
- Increased unit costs of defense systems (as fewer are procured) that have the same effect
- Decisions to proceed with mega-science projects which depend on international sharing of costs
- Expansion of Japanese commercial technology innovation with special potential for U.S. defense and commercial interests
- Increased U.S. government policies and efforts to expand technological cooperation in light of the potential benefits
- At a political level, mutual interests in preventing flow of military technologies (e.g., chemical, nuclear, ballistics, submarine) to third countries with aggressive intentions
- Japanese interest in acquiring more U.S. technologies or market position
- Increasing resort by major corporations to strategic and technological alliances in fields such as microelectronics and automotive industries

- Mutual interests in resolving health, environmental, and other global concerns.

Working to inhibit cooperation and the benefits from cooperation will be a variety of forces mainly related to intensified competition in commercial technologies:

- Increasing defense importance of Japanese dual-use technologies which they will be reluctant to share for fear of jeopardizing commercial advantage
- Reduced Japanese interest in cooperation as its independence and leadership in advanced technologies continues to outstrip the U.S.
- Increased U.S. sensitivity to commercial risks of further sharing of defense or other technologies with Japan
- Continued cultural, linguistic, behavioral, and inertial obstacles
- Lack of experience, motivation, and orientation by U.S. firms to identify, access, or exploit even domestically available, let alone foreign, technologies
- Reduced financial capabilities by growing numbers of U.S. high-tech companies under pressure of foreign competition.

Whether the balance of these conflicting forces will tend to expand or contract U.S.-Japan technological cooperation from current levels is far too complex to foresee at this time. What appears certain is that growing commercial and technological competition between the two countries will be an increasing factor. So too will increased efforts by the two governments to expand technological cooperation. (For example, the Science and Technology Agency's Frontier Research Program is hosting a dozen U.S. scientists; by the end of the decade 100,000 students are expected to be studying in Japan.[13] However, based on experiences and results of efforts to date, success will require a far greater commitment of effort and resources by U.S. officials and industries than has been forthcoming to date.

In terms of cooperation for maintenance of international security, the foundations for U.S.-Japan cooperation in security-related technologies have been of fundamental importance. As a consequence of World War II, Japan became a signatory to the Nuclear Nonproliferation Treaty, and developed very clear policies outlawing development, production, possession, or even entry of nuclear weaponry into Japan. (At the same time, Japan has simultaneously pursued vigorous nuclear research and nuclear power programs directed at peaceful uses.)

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13 "Japan's Science and Technology Aim Toward Globalization," Will Lepkowski, *Chemical and Engineering News*, May 8, 1989, p. 7-14.

The challenges of cooperation to prevent arms proliferation in the Third World will pose a special challenge for the interests of both countries, particularly in chemical weapons. Because some chemical arms can be made using industrial processes which look like segments of other common chemical manufacturing processes, singular traits which distinguish weaponry from peaceful applications are not present to define limits for chemical arms. Concerned nations, including Japan and the United States, can, through a process of education, international negotiation, and alert monitoring, make a contribution toward limiting the spread of chemical arms. Advanced technologies will have a role in strengthening such programs, in ways that are only now emerging as arms reductions and controls are seriously negotiated.

## F. SUMMARY

A broad harmony of security views among the Pacific Rim powers and the complementarity of their security capabilities have helped to maintain the stability and have contributed to the impressive growth of the economies and technological infrastructure of the region.

Dramatic changes in relations between COCOM countries and the USSR and Eastern Europe mandate broad reconsideration of export control policies. The political and economic liberalizations and tension reductions taking place in Eastern Europe as yet have seen little reflection in East Asia, but could become more visible as Gorbachev's anticipated 1991 visit to Japan approaches. Meanwhile, COCOM members will find it necessary (a) to understand more clearly the costs and implications of continuing or modifying such policies, and (b) to adapt international technology control to the changes in East-West relationships. One result of this process is likely to be a narrowing and deepening of those technologies selected for control.

Finally, if the improving political climate in Eastern Europe continues to flourish and particularly if it extends to East Asia as well, concerns over the military threat and the number of proscribed destinations will be correspondingly reduced. Then the challenge of export control in general, and of technology control in particular, will become smaller and more manageable aspects of East-West relations. Ironically, however, reductions in East-West tensions, arms budgets, and military patronage in Third World areas show signs of intensifying Third World demand for sophisticated military equipment--spurred by intensified competition among the industrial nations to sustain their defense industries through increased export. Unless steps are taken to reverse these mutually reinforcing

trends, control mechanisms will need to be retained and redirected toward preventing export of sophisticated military technology to Third World areas where the potential for conflict is high.

# V. THE FUTURE

## A. LEARNING FROM THE PAST

We develop clearer insight into the process of achieving our national goals by looking carefully at the effect of past infusions of advanced technology on Russia and, later, the Soviet Union. Is it effective to broadly restrict export of military technology to potential adversaries, or do the costs of such restrictions outweigh the benefits? The answer is not clear. A key consideration, however, is whether potential adversaries are able to use imported technologies effectively and to build research and production capabilities based on them. If so, how quickly can it be done?

Western democracies have provided substantial packages of advanced technologies, know-how, manufacturing materials, facilities, and other capabilities to the USSR and its predecessors for a very long time. A significant cycle of modernization initiatives was undertaken by Czar Peter I (Peter the Great). These efforts constitute an early, classic case of technology transfer. Broad military force modernization, naval training, and a host of commercial, industrial, and agricultural measures were taken to move the Russian state toward a modern society and build the international credibility necessary for Russia to assume a broader international role. Although the Czar's programs enjoyed considerable success, many of his efforts to introduce new technologies were adapted and subordinated to traditional practices by the Russian people, and their effectiveness did not last. In a strictly military sense, the evolution of the Russian fleet continued until the Russo-Japanese War when the great fleet steamed more than half way around the world to be beaten in battle by a small, agile, and very ably manned Japanese force at the Battle of Tsushima Strait. Ongoing Soviet naval development, it can be argued, still wrestles with the problems which led to their defeat in this historic meeting.

The development of agriculture in the Soviet Union provides an example of how technology and the Soviet system have interacted. Until approximately World War I, Russia exported large quantities of foodstuffs, even though it was locked into a traditional system of indentured servant fiefs, a system regarded as exploitative and extraordinary in its rigidity and inability to harness modern technological methods. A series of Communist

rulers has periodically brokered transfusions of Western agricultural methods. In spite of such acquired technologies and the cyclic application of collectivization and liberalization, the Soviet Union has lost its self-sufficiency in foodstuffs. This issue has considerable political, economic, and strategic significance because of the potential vulnerability of a country dependent on substantial imports.

Other examples can be taken from World War II. The Soviet Union enjoyed broad benefits from its status as an Allied power opposed to the Axis alliance. As post-war victors in that struggle, they harnessed substantial "state-of-the-art" technical know-how from the Germans, including captive German personnel engaged in multiple advanced technology endeavors. Despite these "leaps toward the future," the Soviet Union remains chronically behind the Western nations in broad spectrum evolution and application of advanced technologies. Moreover, since World War II, the USSR has had major problems converting even its own scientific expertise into useful defense applications in many areas.

Yet, in spite of these serious Soviet shortcomings in translating acquired and developed technologies to its own national advantage, other considerations have supported a cautious allied approach to East-West technology exports in the past. With its tremendous resources and political ability to concentrate them on military applications, the USSR in the past has accomplished important and world-threatening technological feats in developing some advanced weapons and delivery technologies.

Today, following a period of relatively frigid relationships, the Soviets and their allies appear to be on the verge of yet another infusion of such Western technical capability. In this instance the transfer is taking place in a world in which power is becoming multicentered, and technologies evolve at increasing speed. Our primary challenge is to place the evolution of political dialogue and technological advancement in a historical context. We must determine what the Soviet initiatives mean in terms of the total future prospects for the United States, other technologically advanced nations of Europe and Asia, and other nations, particularly those of Eastern Europe.

## B. MAJOR TRENDS

Although the ultimate impact of currently emerging trends is not yet clear, four major forces are apparent with respect to the changing environment for export control:

1. Economic and political liberalization in the USSR and Eastern Europe.
2. Internationalization of defense and dual-use technologies.

3. Proliferation of advanced military technologies in the Third World.
4. Economic integration of the European Community.
5. Reduced Soviet Japanese and East Asian tensions.

Each of these trends is discussed below.

### Liberalization in the USSR and Eastern Europe

One of the most explosive international developments of relevance to the transfer of technology is the liberalization of the USSR and the opening of the nations of Eastern Europe. The political and military ramifications of these events are not the focus of this paper. However, the state of technological evolution within these nations is. These countries will place a high priority on the acquisition and employment of Western technologies for a wide range of uses. Moreover, the industrial firms of most Western nations are anxious to establish themselves in the large and promising markets of the region. Thus, the political reality is that defining technology policy and implementing technology control will be made more difficult by the opening of Eastern Europe and the USSR. The military and political implications have yet to be fully assessed by the United States. Although a reversal of current liberalizing trends is not likely, policy formulation should include consideration of and contingency measures for the event that some reversal could occur.

As the USSR and Eastern Europe become more accessible, the United States is becoming progressively more aware of their technological advances, some of which have not been routinely duplicated in the West. Thus, even for military applications, certain refined materials and industrial processes are owned and controlled by nations of Eastern Europe. Czechoslovakia stands out as a nation particularly successful in developing the technologies of interest to those who monitor world technological advances from an MCTL perspective. We anticipate, therefore, that two important subtrends will emerge. First, as relations with the Eastern Bloc countries improve, more technology will move from the West into the Eastern European nations, making those particular elements potentially more vulnerable to passage to the USSR. Second, new technologies will evolve in Eastern Europe of military significance and interest to the nations of the Free World.

The continued liberalization of relationships with East European nations and the USSR through the glasnost and perestroika policies initiated by Gorbachev will have profound effects on future technology transfer/export control policies of COCOM and other

nations. The existing export control mechanisms and parameters may be ill-suited to meet the political needs of the imminent and probably irreversible policy changes. Therefore, it is appropriate that the United States and its allies begin to craft new standards for export control which align with realistic and achievable goals of self interest across the spectrum of military and non-military national strengths. It does not serve the allied nations well to continue to attempt export restriction if the embargoed goods are easily entering the Soviet Union, especially when doing so is to the detriment of their economic interests.

### Internationalization of Defense and Dual-Use Technologies

The expansion of advanced technologies centers to many nations and regions is a phenomenon linked to five main sources: (1) internationalizing activities of multinational corporations; (2) determination of major industrial nations to remain competitive in leading technologies; (3) the drive among newly industrialized countries to acquire advanced technologies; (4) the internationalization of educational, scientific, and technological exchanges; and (5) determination of advanced and Third World nations to achieve an increased degree of self-reliance in defense relevant technologies.

The continued, indeed magnified, progress of this major trend generates three expectations. First, because technologies breed faster and in more locations than previously, some technologies of military promise will emerge from non-traditional sources. Therefore, technology intelligence and monitoring will have increased importance. Second, it will become more difficult to maintain a technology control system as commercial competition intensifies and the following occur: the number of technology sources increases and diffuses beyond present cooperating nations; it becomes more difficult to assemble a critical mass of countries able to agree on a common adversary or adversaries; and it becomes more difficult to agree on technologies where security control is more important than its economic cost. Third, if U.S. dominance in key defense technologies continues to erode, both access to and control of technology may depend on a combination of increased domestic research and expansion of U.S. international cooperative efforts.

### Proliferation of Advanced Military Technologies in the Third World

Reduction of East-West tensions has been accompanied by persistent and even aggravated existing tensions elsewhere. Local and regional conflicts mainly in the Third World served until recently either as stages for acting out East-West hostilities, or as side-

shows supported by East-West sponsors but subordinated to other East-West priorities. As East-West patronage and military aid has declined, some Third World protagonists able to buy for cash or credit have continued or expanded arms imports. No longer able to count on East-West sponsors for backup with sophisticated weaponry, Third World adversaries have increasingly acquired nuclear, ballistic missile, chemical warfare, and submarine capabilities. In the Middle East and possibly other areas, outbreak of Third World hostilities with such weaponry could jeopardize U.S., Soviet, European, and East Asian benefits from East-West tension reduction. Resurgence of ethnic nationalism and antagonisms in Europe and elsewhere could follow a similar course.

The potential for conflicts between Third World countries to cause serious harm to vital U.S. interests shifted suddenly from the hypothetical to the actual in August 1990. Increased ease of transfer of sophisticated, hard-to-counter defense and mass destruction technologies, and proliferation of competing supply sources have greatly expanded Third World possession of and access to advanced weapon technologies. With the much greater range and reach of missile, aircraft, and submarine technologies now readily available to such nations, their potential to expand even localized conflict of little consequence for U.S. interests into broader conflicts or intimidation which clearly threaten vital U.S. interests is greatly increased. Because several regional conflicts currently overlap, potential for escalation is great. Because Third World powers lack experience managing conflict and integrating command and control, dangers of buildup are exceptionally great.

Ironically, the decline of superpower tensions may have exacerbated forces accelerating proliferation of weapons and diffusion of defense technologies to Third World countries. Reduced defense budgets put heavy pressure on European Community (EC), Soviet, and U.S. industries for major expansion of weapon and military technology exports. Moreover, client state loss of superpower sponsorship and defense support may reduce restraints that superpowers can exercise over client state adventure (e.g., by withholding further support). As a result, client states appear to be seeking greater autonomy by finding alternative weapon suppliers and funding, which some industrial nation producers are eager to offer in the face of curtailed national defense budgets--even to the extent of violating national laws restricting exports of chemical and nuclear weapon components. As more nations have acquired advanced technology production capabilities with military applications, difficulties of limiting proliferation and diffusion have risen. Differentiating legitimate (welfare-oriented) from dangerous (conflict-oriented) intentions

for use of space, supercomputer, and other dual use technologies greatly compounds the challenges.

### European Community 1992

As 1992 approaches and European Community (EC) efforts to broaden and deepen economic integration move toward culmination, the EC promises to become a larger and more powerful industrial and economic unit than ever before. Common standards applicable to trade, currency, investment, and other economic activities will enhance the market for technologies and the intensity of competition for technology by the community. Both European and foreign industrial firms have for some time worked to position themselves advantageously in anticipation of such integration. The overall effect on technology development, competition, and technology controls will be profound. This is particularly apparent in a practical sense when one realizes that Ireland, a member of the European Community, is not a member of COCOM. As the EC programs for greater unity gain momentum, the role of COCOM members who are not in the EC will require adjustments which are not yet clear.

The European Economic Community (EEC) was established by the 1957 Treaty of Rome. The goal was a common market, but there remained a maze of border controls, government subsidies of national industries, closed national systems of procurement, national regulation of industrial standards, copyrights, transportation, banking, insurance, health requirements for the entry of goods, and so forth. In 1967 the EEC, The European Coal and Steel Community, and the European Atomic Energy Community merged into the European Community (EC) and agreed on a goal of full economic unity in early 1970. It was never met. Years of attempting to preserve the fragmented, protected, and highly regulated national economies had led to competitive weakness and high unemployment in Europe. In the meantime, Canada, Japan, and the United States had surged technologically and succeeded in generating millions of new jobs.

In March 1985 the EC, consisting of 12 countries (Belgium, Denmark, Federal Republic of Germany, France, Greece, Italy, Netherlands, Ireland, Portugal, Spain, Luxembourg, and the United Kingdom), decided that it should constitute a single market by the end of 1992. The Single European Act signed in 1986, which amends the Treaty of Rome, endorses the commitment to a unified market, allowing for decisions in most areas to be taken by a qualified majority, but the European Council remains the top decisionmaking body within the EC. The European Commission, as the prime regulatory

agency under the Council, has proposed 279 implementing directives which must be in place by 1992. As of July 1990, agreement had been reached on 107 of them, and the corresponding directives issued.

The current transformation is aimed primarily at supplanting numerous fragmented national markets with a unified market which is expected to stimulate growth, efficiency, and competition. A further aim is to facilitate the penetration of external markets through trade and investment for the industries of European countries, many of which depend on exports for their growth and have capital available for placement abroad. It is also widely believed abroad to be aimed at minimizing the penetration of the EC by outside competitive forces despite assertions to the contrary. Major areas of focus in the unification effort (in addition to the Common Agricultural Policy, which absorbs 70 percent of the EC's budget, and favors European farmers over foreign farm imports to the EC) are in commercial sectors. In financial services, foreign banks and insurance companies will be allowed to set up branches in the EC if reciprocity is granted by their country to European banks and companies. The EC has moved toward a relaxed definition of post-1992 reciprocity. Banks and insurance companies already operating in EC countries before 1992 will be treated as European. Many officials believe that the unified market will require a centralized monetary system, with a single currency. The European currency unit (ECU) exists already, but plays only a minor role in transactions. Creating a central bank and a common currency will be difficult.

The 1992 benchmark was born for sound economic reasons and these same reasons continue to drive the process. Entrepreneurs and corporations have continued to work with politicians and diplomats to transcend considerations of local and national interests. They have forced it to work. In anticipation, businessmen are now engaged in formidable maneuvering in the form of mergers, joint ventures, buyouts and acquisitions aimed at maximizing their competitive strength in the community either through transnational alliances in Europe or in their home country against the expected onslaught of competition from abroad. Over time the European Commission will assume a greater regulatory role on issues relating to business transactions, the commercial environment, government subsidies, and so forth. Administration will continue to be under the scrutiny of the Council of Ministers.

In one area which involves "political cooperation," leaders of the 12-nation EC, the European Council, met in Paris on November 18, 1989, to consider financial aid and training measures to encourage the changes surging through Eastern Europe. The fact that

the President of France and the Prime Ministers of Ireland and Spain were mandated to carry out the following three distinct measures is of consequence:

1. Consider the creation of a banking facility for the development and modernization of Eastern Europe.
2. Study the possibility of a European foundation to train management people from Eastern Europe.
3. Open existing EC programs involving education and training to Eastern Europeans.

In light of the rapidly changing events in the Warsaw Pact nations, the EC's capacity to unite will be changed by events such as those in Eastern Europe. East Germany now enjoys free trade with the EC via West Germany, even though linkages continue to tie East Germany economically with other Warsaw Pact nations. This situation is in a state of extraordinarily rapid change. Perhaps this could be the beginning of Gorbachev's "common European house." With the relaxing of the Soviet grip on the Warsaw Pact nations, which is symbolized by the breaching of the Berlin wall, the efforts of the EC could not be more timely. The *economic* outlook for the people of Europe, East and West, is promising. The political outlook appears more troublesome as liberalizations have reopened dormant ethnic and factional disputes, which could in turn complicate economic progress. Nevertheless, there is reason to expect greater concrete progress in economic integration and political reconciliation in Europe in the early 1990's than at any time since World War II.

An additional determinant impact will be the ongoing effort to improve administrative procedures involved in export control. Whether this effort can be sustained in the face of preoccupations with EC integration, reduction of military tensions with the USSR, and the opening of Eastern Europe is a key question.

### Future Relationship Between Japan and USSR

Tensions have eased more slowly in Northeast Asia as Soviet forces have been redeployed there from Southeast Asia. Moreover, Soviet naval force modernization continues, and political hostilities between North and South Korea continue. Most importantly for Japan, that country remains formally at war with the USSR pending resolution of its dispute with the USSR over return of the Northern Territories (Kurile Islands). The long-awaited visit of President Gorbachev to Japan in 1991 is widely expected to produce some reduction of differences even if outright settlement of the

territories issue remains elusive. Meanwhile trade tensions between free market and Communist countries in the region and with Eastern Europe have for all practical purposes been replaced by rapidly expanding trade relations, even between South Korea, China, and the USSR.

Not only Japan but increasingly East Asia's newly industrialized economies offer a rich source for satisfying Soviet and East European hunger for investments and advanced products, production rights, and technology transfers. With Japan as a pre-eminent source of dual-use technologies, the export control implications of trade expansion between Japan and East Europe and Third World nations gives grounds for concern. While Japan has a national policy prohibiting military products or technologies, difficulties in differentiating between commercial and military end-use intentions by foreign buyers is a daunting consideration, especially since dual-use electronic components are becoming an ever-more dominant feature of the most advanced weapon systems. Thus, Japan's cooperation in shaping and enforcement of any future export control or nonproliferation regimes will be increasingly crucial to their success.

## C. CONCLUSIONS

### East-West Export Control

The COCOM processes and most national means to enforce technology control are often time-consuming and painstakingly detailed. In the past, two of the primary criticisms of the U.S. technology control processes were the apparent inability to keep up with either the evolution of technical matters or the demands of the commercial community for case decisions. Both of these criticisms have sound basis in fact and both encapsulate one of the weakest portions of the technology control process. It is slow. Justifiably, administrative mechanisms which are technically detailed require extensive deliberations and careful analysis by highly qualified members of the scientific community. Further, while the processes are imperfect, they have experienced an evolution in response to criticism and are dramatically better than they were a few years ago. Additional sharpening and focus of the export control processes can be anticipated in the future, simply because it remains in the best interests of the member nations to cause this to happen. Export control mechanisms are unlikely to be perfect, but it is possible for them to become usable at a reasonable level of suboptimization.

If the Western nations want the USSR and its allies to develop and stabilize, they must accept some minimum national security risk and provide economic aid in areas such as those enumerated above. The question is not, "Will improved air traffic control radars and improved communications systems support better air defense and provide a better military capability?" That answer will be yes, since all nations depend on joint use of air traffic control radars and communication for both civil and military purposes. Rather, the question is, "Do the economic advantages for the recipient country and the rest of the world outweigh the national security risks?" If that answer is affirmative, then the technology transfer decision process is much easier to implement.

We may have arrived at an historic point in the evolution of East-West export control similar to one Mr. Winston Churchill described in another context as the "End of the Beginning." Certainly export control is well entrenched within U.S. policy. It has suffered through the growing pains of debate, inopportune applications, attempts at harmonization in the international community, and many re-examinations. Its role in the future will surely change; adjustment to much-reduced East-West tensions will be the main focus of that change.

### Broader Export Control Issues

If these trends were solely a matter of demand for new weapons technologies accompanied by a decline, or no increase, in willing suppliers, the issue might be moot. Unfortunately the opposite is the case. Current sharp reductions and prospectively greater cuts have prompted NATO and Warsaw Pact nations alike to scramble for ways to cope with the economic and security consequences of these cuts. Export-related efforts to sustain defense businesses can include measures to (1) continue and stretch out production of weapon systems and components by soliciting export orders; (2) license or sale of technologies to bolster revenues; (e) support for third-country defense technology development as part of offsets to win major military export sales, and probably numerous other variations on this general theme.

While ITAR controls were generally an adequate means for limiting Third World and ethnic rebel arms acquisition in the past, the escalation to nuclear, ballistic, chemical, and submarine technology and equipment acquisition forces the issues of whether some form of technology export control mechanism is needed, and by extension, whether COCOM or some other control mechanism such as one linked to intensified intelligence monitoring is more appropriate. Thus, while forces unleashed by Glasnost will likely lead

to major modifications of military export and technology controls in an East-West context, other such forces may well require measures to strengthen safeguards in other directions, even further changing the nature of such controls as we know them today.

A few broad conclusions appear defensible even at this early stage:

1. Economic integration in the European Community and economic reform and revitalization in Eastern Europe and the Soviet Union are reducing the pressures, concerns, and motivations for resolving East-West export control issues among NATO allies. Improving prospects for normalization of relations between Japan and the USSR, and between North and South Korea, are likely to produce a similar diffusion of control interests in East Asia.
2. The increased prominence of Third World conflicts is accelerating and expanding the proliferation of weapons and the ability to deliver them over greatly expanded areas.
3. Rapid internationalization of dual-use and defense technologies, combined with increased pressure to export caused by declining defense budgets and overcapacity in large-scale defense industries, is exacerbating proliferation of weapons.

We expect the focus of technology transfer issues to shift from East-West to industrial-Third World as a result of these changes. The common interests of the United States and Japan offer a forum for increased technical and political cooperation during the next decade.